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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/625,114

07/22/2003

Robert James Howard

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DEMONT & BREYER, LLC
100 COMMONS WAY
HOLMDEL, NJ 07733

EXAMINER

SMITHERS, MATTHEW

ART UNIT

PAPER NUMBER

2137

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/625,114

Applicant(s)

HOWARD, ROBERT JAMES

Examiner

Matthew B. Smithers

Art Unit

2137

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,5,6,8,9,12,13,15,16,19,20,22,23,26 and 27 is/are rejected.
- 7) ☒ Claim(s) 3,4,7,10,11,14,17,18,21,24,25 and 28 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 7/22/03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

The information disclosure statement filed July 22, 2003 has been placed in the application file and the information referred to therein has been considered as to the merits.

Claim Objections

Claim 7 is objected to because of the following informalities: As presently written, claim 7 depends from claim 5. In reviewing the entire application, it appears that claim 7 should depend from independent claim 6 (see claims 12, 13, 20, 21, 27 and 28). For purposes of the examination, claim 7 will be treated as being dependent on claim 6.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1, 5-8, 12-15, 19-22 and 26-28 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 1, 8, 15 and 22 are directed to a method for dividing a software program into three distinct parts (executable image, data image, and execution history image) and classifying the first statement in the execution history into a mutable

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(changeable) or an immutable (non changeable) statement. This claimed subject matter lacks a practical application of a judicial exception since it fails to produce a useful, concrete and tangible result. Specifically, the claimed subject matter does not produce a tangible result because the claimed subject matter fails to produce a result that is limited to having a real world value rather than a result that may be interpreted to be abstract in nature as, for example, a thought, a computation, or manipulated data. More specifically, the claimed subject matter provides for classifying a statement into one of two groups but fails to have the result stored or displayed. This produced result remains in the abstract and, thus, fails to achieve the required status of having real world value. Claims 5, 12, 19 and 26 depend from independent claims 1, 8, 15 and 22, respectively, and none of the listed dependent claims cure the deficiency of their respective independent claim. Therefore, claims 5, 12, 19 and 26 are also deemed non statutory for the reasons given above.

Claims 6, 13, 20 and 27 are directed to a method for dividing a software program into three distinct parts (executable image, data image, and execution history image), executing statements, constants and pointers in the executable image and processing data in the data image. This claimed subject matter lacks a practical application of a judicial exception since it fails to produce a useful, concrete and tangible result. Specifically, the claimed subject matter does not produce a tangible result because the claimed subject matter fails to produce a result that is limited to having a real world value rather than a result that may be interpreted to be abstract in nature as, for example, a thought, a computation, or

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manipulated data. More specifically, the claimed subject matter provides for executing and processing (manipulating) data but fails to have the result stored or displayed. This produced result remains in the abstract and, thus, fails to achieve the required status of having real world value.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this

Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 6, 8, 9, 13, 15, 16, 20, 22, 23 and 27 are rejected under 35

U.S.C. 102(e) as being anticipated by U.S. patent application 20030217277 granted to Narayanan.

Regarding claim 1, Narayanan meets the claimed limitations as follows:

“A method comprising: dividing an executable software program in memory into an executable image, a data image, and an execution history image; and classifying a first statement in said execution history image into one of a mutable statement and an immutable statement.” see paragraphs [0023]-[0037] and Figures 1 and 2.

Regarding claim 2, Narayanan meets the claimed limitations as follows:

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"The method of claim 1 further comprising: executing cryptographic integrity checks on said immutable statement; and encrypting said immutable statement."

see paragraphs [0023]-[0037] and Figures 1 and 2.

Regarding claim 6, Narayanan meets the claimed limitations as follows:

"A method comprising: dividing an executable software program in memory into an executable image, a data image, and an execution history image; executing executable statements, local constants, and singly de-referenced pointers in said executable image; and processing data, data write-backs, and data read-backs in said data image, wherein said data image is accessed from said executable image using a computed offset into said data image from said executable image."

see paragraphs [0023]-[0037] and Figures 1 and 2.

Regarding claim 8, Narayanan meets the claimed limitations as follows:

"An apparatus comprising: a processor; a memory connected to said processor; an executable software program residing in said memory; and an operating system residing in said memory and executing on said processor, wherein said operating system comprises a software module for: dividing an executable software program in memory into an executable image, a data image, and an execution history image; and classifying a first statement in said execution history image into one of a mutable statement and an immutable statement." see

paragraphs [0023]-[0037] and Figures 1 and 2.

Regarding claim 9, Narayanan meets the claimed limitations as follows:

"The apparatus of claim 8 wherein said operating system further comprises a software module for: executing cryptographic integrity checks on said immutable

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statement; and encrypting said immutable statement.” see paragraphs [0023]-[0037] and Figures 1 and 2.

Regarding claim 13, Narayanan meets the claimed limitations as follows: “An apparatus comprising: a processor; a memory connected to said processor; an executable software program residing in said memory; and an operating system residing in said memory and executing on said processor, wherein said operating system comprises a software module for: dividing an executable software program in memory into an executable image, a data image, and an execution history image; and executing a statement in said executable image, wherein said executing further comprises executing data write-backs and data read-backs in said data image, and wherein said data image is accessed using a computed offset into said data image from said executable image.” see paragraphs [0023]-[0037] and Figures 1 and 2.

Regarding claim 15, Narayanan meets the claimed limitations as follows: “An apparatus comprising: a host computer comprising a memory and a processor; an executable software program residing in said memory; and an operating system residing in said memory and executing on said processor, wherein said operating system comprises a software module for: dividing an executable software program in memory into an executable image, a data image, and an execution history image; and classifying a first statement in said execution history image into one of a mutable statement and an immutable statement.” see paragraphs [0023]-[0037] and Figures 1 and 2.

Regarding claim 16, Narayanan meets the claimed limitations as follows:

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"The apparatus of claim 15 wherein said operating system further comprises a software module for: executing cryptographic integrity checks on said immutable statement; and encrypting said immutable statement." see paragraphs [0023]-[0037] and Figures 1 and 2.

Regarding claim 20, Narayanan meets the claimed limitations as follows:

"An apparatus comprising: a host computer comprising a memory and a processor; an executable software program residing in said memory; and an operating system residing in said memory and executing on said processor, wherein said operating system comprises a software module for: dividing an executable software program in memory into an executable image, a data image, and an execution history image; and executing a statement in said executable image, wherein said executing further comprises executing data write-backs and data read-backs in said data image, and wherein said data image is accessed using a computed offset into said data image from said executable image." see paragraphs [0023]-[0037] and Figures 1 and 2.

Regarding claim 22, Narayanan meets the claimed limitations as follows:

"A machine-readable medium comprising a software module for: dividing an executable software program in memory into an executable image, a data image, and an execution history image; and classifying a first statement in said execution history image into one of a mutable statement and an immutable statement." see paragraphs [0023]-[0037] and Figures 1 and 2.

Regarding claim 23, Narayanan meets the claimed limitations as follows:

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"The machine-readable medium of claim 22 further comprising a software module for: executing cryptographic integrity checks on said immutable statement; and encrypting said immutable statement." see paragraphs [0023]-[0037] and Figures 1 and 2.

Regarding claim 27, Narayanan meets the claimed limitations as follows:
"A machine-readable medium comprising a software module for: dividing an executable software program in memory into an executable image, a data image, and an execution history image; and executing a statement in said executable image, wherein said executing further comprises executing data write-backs and data read-backs in said data image, and wherein said data image is accessed using a computed offset into said data image from said executable image." see paragraphs [0023]-[0037] and Figures 1 and 2.

Allowable Subject Matter

Claims 3, 4, 7, 10, 11, 14, 17, 18, 21, 24, 25 and 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

With respect to claims 3, 4, 10, 11, 17, 18, 24 and 25, the cited prior art fails to specifically teach executing executable statements, local constants, and singly de-referenced pointers in said executable image; processing data, data

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write-backs, and data read-backs in said data image, wherein said data image is accessed from said executable image using a computed offset into said data image from said executable image; logging the usage of said first statement into said execution history image; and terminating said executable software program when a mutable statement changes an immutable statement in memory; re-mapping said first statement into a new executable software program wherein immutable statements are stored in locations in memory such that executing mutable statements cannot overwrite mutable statements.

With respect to claims 7, 14, 21 and 28 the cited prior art fails to specifically teach logging the usage of a first statement into said execution history image as said statement is processed.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

A. Debar et al (US 20050091528) discloses a method for detecting attack programs hidden in data chains.

B. Asher et al (US 20040255146) discloses a method securing a program by segregating the stack.

C. Brodley et al (US 20040168078) discloses a method for protecting a computing device against attacks.

D. Milliken (US 20030065929) discloses a method for inhibiting an attack on a computer.


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E. Shao et al., "Defending Embedded Systems Against Buffer Overflow via Hardware/Software", discloses a method for protecting against stack smashing and function pointer attacks using a hardware boundary check method.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew B. Smithers whose telephone number is (571) 272-3876. The examiner can normally be reached on Monday-Friday (8:00-4:30) EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Emmanuel L. Moise can be reached on (571) 272-3865. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Matthew B Smithers
Primary Examiner
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